

## ELECTRONIC VOTING SYSTEM

## CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 60/252,762, filed November 22, 2000, and is a continuation-in-part of each of U.S. Patent Application No. 09/534,836, filed March 24, 2000; U.S. Patent Application No. 09/535,927, filed March 24, 2000; and International Patent Application US00/07986, filed March 24, 2000. Each of these four applications is incorporated by reference in its entirety.

## TECHNICAL FIELD

[0002] The present invention is directed to the field of electronic polling.

## BACKGROUND

[0003] In any election, it is important to accurately capture, preserve, and tabulate the intent of the eligible electorate. In recent elections, the voting systems employed have failed to meet these objectives in significant respects.

[0004] In typical modern voting systems, voter intent is translated to a binary representation to enable efficient and timely tabulation of votes. Paper-based systems, such as punch card and optical scanning systems, perform this translation in two steps. First, a voter translates his or her intent to a paper ballot, such as by punching small holes at particular locations on the ballot. Second, the paper ballot is digitized, such as with an optical or electrical scanner, yielding a binary representation of the voter intent. This binary representation is not typically kept for a significant period of time, but generally exists long enough to be added to a running total kept by the tabulation system.

[0005] It has been recognized that each of these two translation steps is subject to error. Typical examples include confusing ballot layouts that make it and ballots

that may be incompletely punched, which make it difficult for voters to translate their intention to the paper ballot; scanning interfaces that are subject to misalignment, causing ballots to be inaccurately scanned; and translation and conversion programs that operate incorrectly or out of sync with the style of the paper ballot, causing correctly scanned votes to be mistabulated.

[0006] These potential errors are in fact realized somewhere in nearly every large-scale election. In response, many election officials have gravitated towards retaining the representation of that intent that is closest to the original – the paper ballots. When questions or issues arise, they turn to the paper ballots as the indicator of voter intent. Of course, this does nothing to solve the inaccuracies that can be introduced in the initial translation of intent to paper, nor those that arise from the troubles inherent in interpreting fundamentally analog data.

[0007] Finally, all voting systems must address questions regarding the preservation of intent, both before tabulation and after the election. Once again, paper based systems rely upon retention of the paper ballots themselves to act as the paramount indicator of the original voter intent. Of course, nothing in paper based systems inherently protects these ballots from modification, either inadvertent or intentional.

[0008] In view of these shortcomings, improved voting systems having any or all of the following characteristics would have significant utility: improved accuracy of the interface used by the voter to record his/her intent; reduced number of separate translations in the path from original voter intent to tabulatable data, which in turn reduces the number of possible translation errors; enabling the voter to verify that the tabulatable form of the ballot does accurately reflects his or her intent before it is included in the tally; and protection of the stored record of voter intent from modification, both inadvertent and intentional.

## BRIEF DESCRIPTION OF DRAWINGS

[0009] Figure 1 shows selected components of a typical environment in which the facility operates.

- [0010] Figure 2 is a block diagram showing some of the components typically incorporated in at least some of the computer systems and other devices on which the facility executes.
- [0011] Figure 3 shows a typical distribution of functionalities of the facility across components in environments in which the facility typically operates.
- [0012] Figure 4 is a data flow diagram showing aspects of how ballots are typically processed by the facility.
- [0013] Figure 5 is a display diagram showing an initial instructional display typically displayed by the facility.
- [0014] Figure 6 is a display diagram showing a sample display presented by the facility for selecting a pair of candidates in a race for an office.
- [0015] Figure 7 is a display diagram showing the selection of a pair of candidates in a race.
- [0016] Figure 8 is a display diagram showing a warning against selecting more than the maximum number of candidates.
- [0017] Figure 9 is a display diagram showing the selection of a different pair of candidates.
- [0018] Figure 10 is a display diagram showing a sample display presented by the facility for a non-office ballot issue.
- [0019] Figure 11 is a display diagram showing the selection of an answer to a non-office ballot issue.
- [0020] Figure 12 is a display diagram showing a sample confirmation display presented by the facility.
- [0021] Figure 13 is a display diagram showing the display of a confirmation message.
- [0022] Figure 14 is a display diagram showing a concluding message typically displayed by the facility.

## DETAILED DESCRIPTION

- [0023] A software facility for conducting an election ("the facility") is provided. Embodiments of the facility use a specialized public key infrastructure to authorize poll workers to in turn authorize eligible voters to vote. Enough information is typically maintained for each voted ballot cast to trace it to the individual poll worker that authorized the voter who cast the ballot, through intermediate election officials, up to a single ultimate authority for authorizing eligible voters.
- [0024] Embodiments of the facility provide a digital user interface used by authorized voters to vote a ballot. This interface prevents voters from partially marking their choices, or otherwise leaving their intent in question. This voted ballot is transformed from an initial internal form into an external form in which it is transmitted to a voted ballot repository, then transformed back into the internal form, which is displayed to the voter for confirmation. These steps help to ensure that voter intent is accurately represented in voted ballots.
- [0025] A single "ballot style" is used to generate blank ballots, and accessed by all copies of the program that transforms voted ballots between internal and external form. In some embodiments, a specialized public key infrastructure is used to certify this ballot style for use in the election. The ballot style specifies the order of election races on blank and voted ballots, as well as the order of candidates. (As used herein, "races" include offices for which a human candidate is selected, as well as other ballot issues, such as referenda. "Candidates" include both human candidates, as well as possible responses to other ballot issues, such as whether to approve or reject a referendum.) Additionally, all copies of the ballot transformation program used in the election system are typically certified to be identical. These steps help to ensure that voter intent is not corrupted in the processing of voted ballots.
- [0026] Embodiments of the facility provide safeguards against ballot tampering after ballots are voted. In some embodiments, each voted ballot is signed with a private key associated with the voter voting the ballot. This signature, together with the corresponding public key, establishes that the ballot has not been

modified since being voted. These voter keys are optionally stored on one or more portable memory devices possessed by each voter. The voter's public key may be signed with the private key of an election worker who verifies that the voter is eligible to vote. Together, this information establishes that the voted ballot was voted by an eligible voter. In some embodiments, voted ballots are each encrypted with an election key, and are decrypted by the joint efforts of multiple parties, using a key sharing protocol, or other threshold decryption techniques. In some embodiments, a voting receipt is issued to the voter, which the voter or a proxy can use to verify that the ballot voted by the voter was received and counted in the election result. Also, some embodiments of the facility store voted ballots in random positions in a data structure, preventing the voted ballots from being associated with particular voters based upon the order in which voters voted their ballots.

[0027] By operating as described, embodiments of the facility provide several advantages, including: improving the accuracy with which the voter records his or her intent; reducing the number of separate translations in the path from original voter intent to tabulatable data, and thus reduce the number of possible translation errors; enabling the voter to verify that the tabulatable form of the ballot does accurately reflect his or her intent before it is included in the tally; and protecting the stored record of voter intent from modification, both inadvertent and intentional.

[0028] Figure 1 shows selected components of a typical environment in which the facility operates. Those skilled in the art will appreciate that the facility may be employed in a wide variety of other environments, including those having different components. Ballot approval tools 111 are typically used by election officials to approve a particular ballot style for an election. Election officials typically also use the election configuration, administration, and results tools to prepare for and oversee an election. These tools communicate with an election data center 120, and are typically located in election offices 110. The election data center 120 provides data, such as initialization data 131, used at one or more poll sites 130.

These poll sites may either be physical poll sites to which voters physically go in order to vote, or may be virtual poll sites accessed by voters remotely. Each poll site typically has a poll site server 132 that receives initialization data from the election data center. To the poll site server are connected one or more poll worker machines 133 used by poll workers to administer the polling within the poll site, including authorizing eligible voters to vote; vote clients 134 used by voters to generate voted ballots; and receipt stations 135 at which voters may obtain receipts evidencing their voting. These receipts 150 may be given to the voter in a variety of forms, including on paper or a variety of computer-readable portable memory devices. The receipts may also be conveyed to the election offices, along with certificates, voted ballots, and audit log data 140.

[0029] Figure 2 is a block diagram showing some of the components typically incorporated in at least some of the computer systems and other devices on which the facility executes. These computer systems and devices 200 may include one or more central processing units ("CPUs") 201 for executing computer programs; a computer memory 202 for storing programs and data while they are being used; a persistent storage device 203, such as a hard drive for persistently storing programs and data; a computer-readable media drive 204, such as a CD-ROM drive, for reading programs and data stored on a computer-readable medium; and a network connection 205 for connecting the computer system to other computer systems, such as via the Internet. While computer systems configured as described above are preferably used to support the operation of the facility, those skilled in the art will appreciate that the facility may be implemented using devices of various types and configurations, and having various components.

[0030] Figure 3 shows a typical distribution of functionalities of the facility across components in environments in which the facility typically operates. Those skilled in the art will appreciate that functionalities of the facility may also be distributed in various other manners. A Ballot Collection Agency Control Center 300 houses remote data center control applications owned/maintained by a ballot collection agency. These include a Root Certificate Management Module 301 that provides

secure storage and access policies for the private signing keys belonging to the Ballot Collection Agency, and a Jurisdiction Manager Module 302 comprising software for creating and modifying jurisdiction records in the Master Database 332, housed in the Data Center 330.

- [0031] Installed in Jurisdiction Offices 310 are an Appliance Hardware Module 311 which comprises critical election creation and management hardware requiring high security as well as software necessary to operate the hardware. This module includes a Client Boot Application 312 which comprises boot sequence code identical to that run on the Vote Client in the poll site, a CD Verification 313 which comprises software to verify authenticity of Election Configuration CD (identical code is typically run in the poll site to prevent use of counterfeit CD), and a Ballot Approval Application 314 which comprises software for final ballot style (blank ballot) approval by jurisdiction. The code for ballot display used by the Ballot Approval Application 314 is identical to the code used for display by the Vote Client at the poll site. The Ballot Approval Application 314 also generates the jurisdiction root signature on all the individual ballot styles after ballot style review is completed favorably. Also installed in Jurisdiction Offices 310 are one or more Windows Machine(s) 320 which run election creation and management software that does not have high security requirements. This software includes an Administration Database 321 which comprises a database maintained by the jurisdiction for managing certificates, ballot styles, and election results, a Election & Ballot Configuration Application 322 which comprises software for creating precincts and ballots, Election, Ballot & Permission Info (XML) 323 which comprises digital data (and digital signature) -- formatted according to specification – encapsulating the final state of the Administration Database 321 for election day, a Data Uploader 324 which comprises software for transferring Election, Ballot & Permission Info (XML) 323 to the Ballot Collection Agency Data Center 330 for archive and CD production, a Election Results Application 325 which comprises software for tabulating, displaying, auditing, and archiving election results, Election Results XML 326 which comprises digital data

-- formatted according to specification -- encapsulating the final set of election results (or tallies), Election Archives 327 which provide long term storage of all data necessary to completely re-create election tabulation and audit, Printed Ballots 328 which comprise optional paper ballots printed from electronic data, and a Transcript Verification Application 329 which comprises software for verification of the election transcript. This application constitutes a complete data audit of election integrity. The module checks all signatures and certificate chains, decryptions, proofs of validity, ballot style signatures, etc.

[0032] A Data Center 330 embodies computing infrastructure maintained by Ballot Collection Agency. It includes an Election Configuration Engine 331 which comprises software that packages the data received via upload for efficient CD production, a Master Database 332 which comprises a database for storing jurisdiction information originating from the Jurisdiction Manager 302 along with election specific information pertaining to audit of the election construction process. The latter information originates from the Ballot Approval Application 314. (This database is the same as database 358.) The Data Center 330 further includes a Boot Engine 333 which comprises software for managing poll site network configuration addresses and other constants. These constants are needed by the poll site applications at initialization, and hence must be supplied on the election CD. (Boot Engine 333 is typically the same as Boot Engine 359.) The Data Center 330 further includes one or more Election Database(s) 334 which comprise databases for storing all information essential to election day operation, including ballot styles, and complete jurisdiction certificate tree (PKI). (Election Database 334 is typically the same as Election Database 352.) The Data Center 330 further includes Certified Software Images 335 which comprise all election related software running in the Data Center has been certified and reviewed by an independent testing authority, a CD Image Preparation Module 336 which comprises software and hardware for creating CD copies that are used at the Poll Site during all election operations. These CDs include both generic system software and all data that is jurisdiction specific, including ballot style and

PKI information. The Data Center 330 further includes a Ballot Database 337 which comprises a database structure for receiving and storing voted ballots. In the Data Center, this amounts to an empty copy of a database "template". The structure is necessary for proper initialization of the Poll Site Server at election startup. It does not, at this point, contain any ballots. The Data Center 330 further includes Audit Logs 338 which comprise operational audit data required by law. A Poll Site 340 includes one or more Poll Worker Station(s) 341 which individually comprise a computer operated by a poll worker for the purposes of issuing voter certificates and keys, as well as test certificates and keys, one or more Vote Station(s) 342 which individually comprise a computer for core vote casting interaction. Functions of a Vote Station 342 include display of appropriate ballot style, user interface for collecting voter choices, confirmation screen generation, ballot encoding, ballot encryption, ballot signing, and ballot submission. A Poll Site 340 further includes one or more Receipt Station(s) 343 which individually comprise a computer that receives and verifies the voter's receipt for voting (digitally signed using a private key stored only during election hours). This receipt is positive confirmation to the voter that his/her ballot was successfully added to the ballot box data, and serves also as irrefutable proof thereof. The Receipt Station also stores multiple copies of the all receipts on redundant storage devices. In case the voter does not provide his/her receipt to the tabulation process, either personally or by proxy, these storage devices still provide protection against ballot loss or deletion. A Poll Site 340 further includes a Client Boot Application 344 which comprises boot sequence code identical to that run in the Jurisdiction Offices to for the Ballot Approval Application 314, a Poll Worker Application 345 which comprises software for generating and signing voter keys and certificates. Certificates contain precinct and ballot style information in addition to the voter public key. A Poll Site 340 further includes a Vote Client Application 346 which comprises software run on the Vote Station 342, implementing all functionality described therein, a Receipt Station Application 347 which comprises software run on the Receipt Station 343,

implementing all functionality described therein, a Report Application 348 which comprises software to generate a ``state of the ballot box" report. This application is Used to verify empty ballot box before opening polls. It also can be used for end of day reports for multi-day elections. It also can provide for the counting of test ballots. A Poll Site 340 further includes a CD Verification Module 349 which comprises software for verifying the integrity of the election specific and generic software distribution which makes up the entire contents of the election CD. This software is run on a Linux computer. A Poll Site 340 further includes a Poll Site Server 350 which embodies software and hardware implementing all functionality associated with the digital ballot box; and in particular embodies the ballot box which is able to collect both official ballots and test ballots. A Poll Site Server 350 includes a Server Install Application 351 which comprises software for configuring the Poll Site Server with the appropriate initialization data, an Election Database 352 which comprises a database for storing all information essential to election day operation, including ballot styles, and complete jurisdiction certificate tree (PKI) (the same as 334), a Vote Engine 353 which comprises the core software module for receiving and integrating all data produced by the Poll Worker Application 345, the Vote Client Application 346), and the Receipt Station Application 346. Most importantly this data includes all voter certificates and voted ballots. The Vote Engine 353 is also responsible for providing the correct ballot style to voter based on the voter certificate information contained on the voter portable storage device (IButton). A Poll Site Server 350 further includes a Report Engine 354 which comprises software for generating miscellaneous election status and readiness reports, a Ballot Database 355 which comprises a database structure for receiving and storing voted ballots initialized with the structure in 337, a Tabulation Process 356 which comprises the vote counting process, a Poll Site Control Application 357 which comprises software for high level management of Poll Site Server 350, a Master Database 358 which comprises a database for storing jurisdiction information originating from the Jurisdiction Manager Module 302 along with election specific information

pertaining to audit of the election construction process. The latter information originates from the Ballot Approval Application 314 (the same as 332). A Poll Site Server 350 further includes a Boot Engine 359 which comprises software for managing poll site network configuration addresses and other constants. These are needed by the poll site applications at initialization, and hence must be supplied on the election CD (the same as 333.) A Poll Site Server 350 further includes Precinct Transcripts 360 which individually comprise the complete record of all data required to prove the integrity of the election as conducted in a given precinct, Precinct Results XML Files 361 which individually comprise digital data -- formatted according to specification – encapsulating the final set of results (or tallies) for a given precinct, a Data Package Preparation Module 362 which comprises software and hardware responsible for creating complete permanent archive of all election information. This includes information created as a result of the voting process, such as the election transcript, all voter receipts, and the audit logs, as well as election creation information such as the PKI and ballot styles. A Poll Site Server 350 further includes Audit Logs 364 which comprise operational audit data required by law, and an HD Image Verification Module 365 which comprises software for verifying the integrity of the Poll Site Server writeable media (disk drive). The value of doing this integrity verification is to prevent tampering with the Poll Site Server 350 software during any unattended periods after initial software installation.

[0033] Figure 4 is a data flow diagram showing aspects of how ballots are typically processed by the facility. The facility generates and processes a ballot based upon a ballot style 400. The ballot style is assigned a ballot style number, here "1A1." The ballot style defines the content of a blank ballot by listing each ballot issue in the order that they are presented on the ballot. For each ballot issue, the ballot style lists the issue question, such as the office to be filled or the referendum to be decided, and in ordered list of the possible ballot answers, such as the candidate to elect or the action to be taken on the referendum. The facility uses the ballot style to generate an internal representation 401 of a blank ballot.

It can be seen in the internal representation of the blank ballot that an initial response of "0" is listed for each issue answer. The facility uses internal representation of blank ballot 401 to generate an initial display 402 for the first ballot issue, in which no issue answer is selected, i.e., no candidate is selected. This display is discussed below in greater detail in conjunction with Figure 6.

[0034] When the voter selects a candidate for the President and Vice President race, the facility updates internal representation of the blank ballot 401 to ballot internal representation 404 by changing the response to answer one for question one from "0" to "1." The facility also updates display 402 to produce display 403 in which the selected candidate is displayed. Display 403 is discussed in greater detail below in conjunction with Figure 7.

[0035] If additional ballot issues remain, the facility repeats the above procedure to enable the voter to select answers for each of these ballot issues. When the voter has selected answers for each of the ballot issues, the facility uses a ballot encoder module 405 to transform internal representation of the voted ballot 405 into an encoded, or "external" representation in which the voted ballot can be transmitted to and stored in a ballot box. It can be seen in this external representation 406 that it identifies the ballot style used to generate the ballot, and lists, in order, the values indicating which of the issue answers the voter selected.

[0036] The facility then executes a ballot decode module 407 in order to transform the external representation of the voted ballot 406 produced by the ballot encoder into a new internal representation 408 of the voted ballot. Ballot encoder module 407 provides the same functionality as ballot decoder module 420 used in the tabulation process. In some embodiments, this module is identical, and certified as such by election officials and/or independent auditors. The facility uses this new internal representation of the voted ballot 408 to generate a display 409 of the selections made by the voter for confirmation purposes. Display 409 is discussed in greater detail below in conjunction with Figure 12. Because of the new internal representation of the voted ballot 408 is the result of encoding, then

decoding the initial internal representation of the ballot, as will be the internal representation 421 of the ballot that is eventually tabulated, display 409 produced for confirmation by the voter of the voter's selection is ensured to reflect the selections that will ultimately be tallied if these selections are confirmed by the voter. The facility generates display 410, which explicitly asks the voter to confirm the selections shown in the confirmation display. This display is discussed in greater detail below in conjunction with Figure 8. When the voter does so, the facility executes a ballot encryption and signing module 413 to transform the external representation of the voted ballot 406 into a signed and encrypted external representation of the voted ballot 414. The ballot is typically signed with a private key belonging to the voter, which corresponds to a public key stored by an election worker when the election worker identifies the voter as an eligible voter. "Signing" as used herein refers to generating a digital signature, such as an RSA signature, as is described in Chapter 11 of Menezes, A.J., *Handbook of Applied Cryptography*, CRC Press, 1996, which is hereby incorporated by reference in its entirety. The encryption performed by module 413 preferably includes encrypting every voted ballot with a single election public key. In some embodiments, the facility stores the private key for the voter on a portable computer-readable memory device, enabling the user to provide the private key to the computer system used to generate the voted ballot. In some cases, the private/public key pair for the voter is generated by the voter and carried to the voting site on this device.

[0037] The facility stores this signed and encrypted voted ballot 414 with other signed and encrypted voted ballots 415 voted by other voters in a ballot box 416. In some embodiments, the ballot box 416 is maintained in persistent storage of the poll site server computer system 132 shown in Figure 1.

[0038] In some embodiments, signed and encrypted ballots are each stored in a random position in the ballot box, in order to prevent the signed and encrypted ballot voted by a particular voter from being identified based upon the order in which the voters voted. In some embodiments, this involves selecting a position

for each ballot using a reliable source of random numbers, such as a hardware random number generator. In some cases, this involves dividing each ballot into a short portion containing data items that is desirable to index and a longer portion containing data items that is less important to index. The shorter portion is stored in a randomly-selected database record, while the longer portion is stored in a corresponding position in a file system file.

[0039] Block 417 illustrates the process of tabulating voted ballots. The facility executes a ballot signature check and decryption module 418 to produce from the ballot box a quantity of external representations of voted ballots 419 that have been (1) been signed with the private key of an authorized voter, and (2) decrypted. To check the authorization of the voter, the facility typically uses one or more voter public keys that it has stored to determine if the private key corresponding to one of these public keys was used to sign the ballot. If so, the facility determines whether this public key was signed with a private key of an election worker, and whether that election worker's authority to authorize voters is traceable to the root of the voter authorization tree. If either of these conditions are not satisfied, the facility omits the encoded ballot from the encoded ballots 419 passed forward for tabulation. In some cases, the decryption process involves decrypting each ballot with a single private key corresponding to the public key used to encrypt the ballots. In other embodiments, a key-sharing protocol is used to obtain joint decryption of the voted ballots using a private key shared among a group of different decryption servers. The facility then executes the ballot decoder module 420, which uses the ballot style 400 to transform each external representation 419 of a voted ballot into a corresponding internal representation 421 of that voted ballot. As noted above, ballot decoder 420 operates in the same manner as ballot decoder 407, and, in some embodiments, is identical. It can be seen that the produced internal representations 421 of voted ballots include the same internal representation of a voted ballot as internal representation 408 used to present confirmation display to the voter that voted that ballot. The facility then executes a results aggregation module in order to

tally the internal representations 421 of the voted ballots to produce election results 423, in which the values attributed to each of the ballot issue answers are aggregated, such as by summing.

[0040] Figures 5-14 are display diagrams showing typical displays generated by the facility to enable a voter to complete and confirm a ballot. In some embodiments, the facility presents these displays on a touch-screen monitor so that the voter can select a point on the display by touching a corresponding point on the monitor.

[0041] Figure 5 is a display diagram showing an initial instructional display typically displayed by the facility. The display includes an instructional message 500 about how to complete and confirm a ballot. The display also includes a progress indicator 501 that shows the voter's progress in completing the ballot, as well as a next button 502 for displaying the next display in the sequence of displays for completing the ballot.

[0042] Figure 6 is a display diagram showing a sample display presented by the facility for selecting a pair of candidates in a race for an office. The display of Figure 6 is typically displayed by the facility when the user selects the next button 502 shown in Figure 5. The display includes an indication 600 of the office to be filled, as well as instructions for how to vote for candidates for that office. That is, indication 600 indicates that the office is President and Vice President of the United States, and that the voter should vote for a single pair of candidates. Entries containing eleven pairs of candidates 601-611 are listed, each with an empty check box. The absence of any checked check boxes indicates that no pair of candidates has yet been selected by this voter. To select a pair of candidates, the voter may select the check box for those candidates. For example, to select independent candidates George Washington and John Adams, the voter selects the check box for item 601. The voter may also click the next button 621 in order to display the next ballot issue without voting on the current ballot issue. The voter may also select a back button 623 to retreat one display in the sequence of displays, or select a start over button 624 in order to return to the

beginning of the sequence. The voter may also select a cast ballot button 625 in order to finish the voting process without voting in any of the subsequent ballot issues.

[0043] Figure 7 is a display diagram showing the selection of a pair of candidates in a race. The facility presents this display in response to the voter's touching the check box in entry 601 shown in Figure 6. It can be seen in entry 701 that this check box is now checked. At this point, the voter may attempt to select a different pair of candidates, such as those shown in entry 708.

[0044] Figure 8 is a display diagram showing a warning against selecting more than the maximum number of candidates. Figure 8 is displayed when the voter touches the check box in entry 708 shown in Figure 7. The warning 800 instructs the voter to deselect selected choices before selecting additional choices. The voter may select OK button 801 in order to remove the warning message and return to the display shown in Figure 7.

[0045] Figure 9 is a display diagram showing the selection of a different pair of candidates. Figure 9 is displayed in response to the voter's deselection of the Washington/Adams candidate pair by selecting entry 701 shown in Figure 7 to return to the display of Figure 6, and then selecting entry 608 shown in Figure 6. It can be seen by the check box in entry 908 that the Phillips/Frazier candidate pair is now selected in the President/Vice President race. Having selected this candidate pair, the voter may select next button 921 in order to proceed to the display for the next ballot issue.

[0046] Figure 10 is a display diagram showing a sample display presented by the facility for a non-office ballot issue. This display includes an indication 1000 of the nature of the ballot issue and instructions for voting. The display also contains an entry 1001 that can be selected to approve this proposition, and an entry 1002 that may be selected in order to reject this proposition.

[0047] Figure 11 is a display diagram showing the selection of an answer to a non-office ballot issue. It can be seen that the voter selected entry 1002 shown in

Figure 10, and that entry 1102 is now selected. The voter may select next button 1121 in order to proceed to the display for the next ballot issue.

[0048] Figure 12 is a display diagram showing a sample confirmation display presented by the facility. For each ballot issue, the display includes the ballot question for the ballot issue, as well as the ballot choice selected by the voter. For example, for the first ballot issue, the display includes an entry 1201 indicating that the ballot question is "President/Vice President - vote for one," and an entry 1202 showing the candidate selected by the voter for this office, Phillips/Frazier. A change button is also displayed for each ballot question. For example, a change button 1203 is displayed for the first ballot issue. The voter may select this button in order to return to the display shown in Figure 9, where the voter may select a different pair of candidates for this race than the pair shown in Figure 12. After any such changes are completed, the voter may select a cast ballot button 1241 in order to confirm the presently-selected issue choices.

[0049] Figure 13 is a display diagram showing the display of a confirmation message. The confirmation message 1300 includes a button 1301 that the voter may select in order to review his or her choices, and a button 1302 that the voter may select in order to cast his or her ballot with the current selections.

[0050] Figure 14 is a display diagram showing a concluding message typically displayed by the facility. The concluding message 1400 indicates to the voter that his or her voted ballot has been accepted.

[0051] It will be appreciated by those skilled in the art that the above-described facility may be straightforwardly adapted or extended in various ways. While the foregoing description makes reference to preferred embodiments, the scope of the invention is defined solely by the claims that follow and the elements recited therein.